

## SUSPENSION ARRANGEMENT

The present invention concerns a suspension arrangement including a plate with means for mounting suspension fittings and with coupling means that interact with coupling means on a support.

The invention furthermore concerns a method for making a suspension arrangement including a plate with means for mounting suspension fittings and with coupling means that interact with coupling means on a support.

A large number of suspension arrangements are known which primarily are used in shops for displaying products. These suspension systems are based on modular dimensions determined from the spacing between supports that usually are formed as vertical members which are fastened to a wall. On these members suspension fittings, in the shape of support holders are fastened for supporting shelves that are used for displaying articles/products. Alternatively, suspension fittings in the form of hangers may be provided between two juxtaposed members for supporting hooks or other suspension fittings on which the products are placed.

Some articles, like audio equipment, also necessitate supply of power in order that they may operate. Individual lighting may also be required for providing correct presentation of the goods.

If electric wiring is to be provided, a unsightly mess of wires will often appear, influencing the aesthetic presentation of the articles in a negative way. It is therefore desirable to hide the wires as much as possible. Until now, this has widely been effected by hiding wiring in wire ducts that are fastened to the members and the underside of the shelves. However, this has been associated with drawbacks, among others because the wires would still be visible at the passage around edges on shelves, and because replacing just one single article requires a dismounting of wire ducts in order to release the wires.

The articles may have different shape and size that put different demands on shelves or suspension hooks.

5 Today, there are great demands on the arranging of articles in correct groups with corresponding articles, e.g. pants together with shirts, socks and ties. Each of these products makes demands to suspension fittings, as some are to be displayed on shelves and others on hooks/pegs. It is often difficult to utilise an available wall area efficiently, due to the restrictions of the module determined by the distance between the members of the support. In order to get optimal utilisation of the wall area, there is  
10 need for a small spacing between the support members. This will, however, add to the costs of producing the suspension arrangement.

In prior art suspension arrangements, backgrounds are often a part of the display and contribute to the presentation of the articles. Posters or pictures are therefore placed on  
15 the walls between the members in order to enhance correct presentation of the articles. Mounting of posters is thus determined by the module too which is defined by the spacing between juxtaposed support members.

For several years, there has thus existed a desire for efficient utilisation of space and  
20 an aesthetically correct presentation of articles in a suspension arrangement where the spacing of the support members does not form a restriction, and where there is possibility of presenting articles at individually determined locations and with individually determined disposition of hooks, shelves or other members. There is also a desire for the suspension arrangement to be used for power consuming articles  
25 without the well-known mess of electric wires.

According to the present invention, this is achieved with a suspension arrangement of the type mentioned in the introduction, which is peculiar in that the plate has a front side from which the suspension fittings are projecting, and a back side on which the  
30 mounting means of the plate are disposed, and that the plate is provided at its front side with grooves that along a part of their extension communicate with holes that open on the back side, as the suspension fittings are mounted extending through a hole for supporting with a first support member on the back side and with a second support member supporting against the bottom of the groove.

The method according to the invention is peculiar in that the plate is made with a back side on which the mounting means of the plate are disposed, and with a front side which is provided with grooves that over a part of their extension communicate with holes that open up on the back side, and that the suspension fittings are mounted projecting from the front side of the plate, as they are mounted extending through a hole for supporting with a first support member against the back side and with a second support member supporting against the bottom of the groove.

In the plate it is possible to dispose the grooves with a mutual spacing which is substantially less than the spacing between traditional support members on a wall. Also, it is possible with very little spacing between successive holes in a groove. It is thus possible to operate with rather small modules and thereby achieve very flexible utilisation of the display area. Thereby it becomes possible to dispose products in correct grouping even if they require different support/suspension. For example, pants, shirts, socks and ties may be hanged on hangers/hooks or laid on shelves. Thus it is easy to get an efficient utilisation of an available wall area, as one is not bound by the module determined by the distance between the members of the support or by a modular measure for the height between shelves.

By making a display wall, the plate will preferably be mounted together with juxtaposed identical plates for forming an unbroken wall face which at the front side only display grooves that preferably will be vertically oriented. Alternatively, the grooves may run obliquely or even horizontally if desired. A wall will thus appear for the viewer, from which wall the suspension fittings are projecting. No support members, shelf brackets and back wall appear as is the case with the prior art display walls.

It is possible to enhance the viewer's impression of an unbroken wall by providing an unbroken pattern or picture on the surface of the plates. According to a further embodiment of the invention, the suspension arrangement is thus peculiar in that the front side of the plate is provided with an image formed at the surface of the front side and at the bottom face of the grooves.

Hereby, the wall will appear with a uniformity so that the viewer on the whole cannot see the grooves, irrespectively if these are having sidewalls that run perpendicularly to the bottom face of the groove and the surface of the plate. This is particularly the case if the grooves are shallow so that the sidewalls of the grooves have negligible dimensions compared with the area of the plate surface and the bottom surfaces of the grooves. Alternatively, the grooves may have inclining course in relation to the bottom surface of the groove and the surface of the plate, so that an image is also formed on the sidewalls.

According to a particular embodiment of the invention, the method for making the suspension arrangement is peculiar in that the front side of the plate is provided with an image formed at the surface of the front side and at the bottom face of the grooves, as the image is preferably produced by an inkjet printer. By applying the image with an inkjet printer or by corresponding application technology, in a simple way there may be formed an unbroken image at the front side of the plate/display wall.

It is possible to mount suspension fittings in the shape of shelf support holders, brackets, lamp fittings etc., in the holes. These suspension fittings may be designed in different ways known per se, for bearing against the front side as well as the back side of the plate. At the part projecting from the front side, these suspension fittings will preferably have a thickness corresponding to the width of a groove. Thereby is achieved a stabilising support in lateral direction, which is particularly advantageous for suspension fittings that do not interact with other suspension fittings or shelves. The projecting hooks are thus mounted in a stable way, without any need for stabilising plates for bearing against the surface of the wall.

The holes formed through the plate may be used for passing through power wires for supplying power to displayed articles or for power supply to lamps, or other wires for use in the transmission of signals or data, e.g. loudspeaker wires that connect a displayed amplifier with loudspeakers displayed at another location on the display wall. All wiring may thus be provided at the back side of the plate/display wall.

For easy access to the wires and at the same time to have space behind the plate needed for wiring, the suspension arrangement according to a further embodiment of

the invention will be peculiar in that the support and/or the coupling means of the plate include interacting hook-shaped projections. Alternatively, other coupling means may be used which enable removal of the plate from the support when the need for accessing the back side of the plate arises. At the back side of the plate, fittings may  
5 be provided for power supply and/or wire trays for other wires for signal and data transmission. Such fittings and trays may be mounted at the back side of the plate or on support members on which the plate is mounted.

Furthermore, it is also preferred that the coupling means of the support is formed on a  
10 support section which is mounted on a building wall and which has coupling means that interact with coupling means on a reinforcement section at the back side of the plate in order to provide an interspace between the building wall and the back side of the plate.

15 According to a further embodiment of the invention, the suspension arrangement is peculiar in that the coupling means of the plate are formed on angular reinforcement sections fastened along the length of the plate. Reinforcement against bulging of the plate, even if heavily loaded, is hereby achieved. Such reinforcement sections will usually be positioned with vertical orientation and adapted for interacting with vertical  
20 support members that are mounted on the building wall.

According to a particular embodiment of the invention, the suspension arrangement is peculiar in that the holes are formed as drillings extending from the back side and partly through the plate to a position approximately at the bottom of the grooves.  
25 Alternatively, the holes may be formed by disposing plate members or planks, which have mutual spacing, so that through-going holes appear where the grooves and the mutual spacing are crossing an interspace between the plate members. However, from a manufacturing point of view drilling of holes is a more simple process, and simultaneously is achieved a more flexurally rigid construction in that the rearmost  
30 thickness of the plate can be continuous.

The plate may be formed as a solid plate with milled grooves and drilled holes, or as a laminated sheet or plate. According to a further embodiment of the invention, the suspension arrangement is thus peculiar in that the plate is formed as a laminated sheet

or plate with the grooves formed between juxtaposed elongated front side plates. These elongated front side plates may in a simple way be glued on a base plate, subsequent to the latter being provided with holes in a previous process step. This may be done in an inline production.

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Holes are drilled in the plate, the holes extending from the back side and partly through the plate to a position approximately at the bottom of the grooves, or, as an alternative, through-going holes may be made in a base plate.

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According to a further embodiment of the invention, the suspension arrangement is peculiar in that the grooves have a width between 3 and 8 mm, preferably between 4 and 6 mm, that the grooves have a depth between 3 and 8 mm, preferably between 4 and 6 mm, and that the spacing between juxtaposed grooves is between 30 and 250 mm, preferably between 80 and 100 mm. The grooves will hereby only constitute a

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limited part of the total surface of a display wall, and additionally there will be achieved a good stabilising support laterally, sufficient enough for most fields of application of the display wall for displaying retail articles.

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Other dimensions may, however, be necessary, if the suspension arrangement is used for heavy items, e.g. tools in workshops, DIY centres or tool stores.

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In the above, the invention has been described in connection with a display wall. However, it is noted that the invention also may find application within other fields where flexible suspension of different products is desired, and where possibly it is also desirable to hide the wiring. This may e.g. be the case in walls of offices, and where a wall may be a freely standing partitioning, or in hotels where a wall can be made for flexible disposition of bed tables, lamps, desk sheets, television apparatuses etc.

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The invention will now be described further with reference to the accompanying drawing, where:

Fig. 1 shows a schematic perspective view of parts for a suspension arrangement according to the invention;

- Fig. 2 shows a schematic perspective view according to Fig. 1 but with the parts assembled;
- Figs. 3-5 show the suspension arrangement of Fig. 2 seen in plane view, from the side and from the top, respectively;
- 5 Fig. 6 shows a schematic perspective view of partial suspension arrangement according to the invention;
- Figs. 7-9 show the suspension arrangement of Fig. 6 seen in plane view, from the side and from the top, respectively;
- Fig. 10 shows an enlarged detail of Fig. 7;
- 10 Fig. 11 shows an enlarged detail of Fig. 8;
- Fig. 12 shows plates for use in a suspension arrangement according to the invention;
- Fig. 13 shows an end piece for use in a plate in a suspension arrangement according to the invention;
- Fig. 14 shows an enlarged detail of Fig. 13;
- 15 Fig. 15 shows views of different types of suspension fittings for use in a suspension arrangement according to the invention;
- Fig. 16 shows views of different shelves for use in a suspension arrangement according to the invention;
- Fig. 17 shows an angular reinforcement section intended to be fastened to the back side of a plate in a suspension arrangement according to the invention;
- 20 Fig. 18 shows a fitting for electric installations for use in a suspension arrangement according to the invention;
- Fig. 19 shows an enlarged detail of Fig. 18;
- Fig. 20 shows a second embodiment of a fitting for electric installations;
- 25 Fig. 21 shows an enlarged detail of Fig. 17;
- Figs. 22-23 show wall fittings for use in a suspension arrangement according to the invention;
- Fig. 24 shows a partial enlarged detail of Figs. 22 and 23;
- Fig. 25 shows a plate for use in a suspension arrangement according to the invention, as seen from behind;
- 30 Figs. 26-28 show the plate of Fig. 25 seen in plane view, from the side and from the top, respectively;
- Figs. 29-31 show an enlarged detail of Fig. 26 seen in plane view, from the side and from the top, respectively;

Figs. 32-34 show a plate with suspension fittings and shelves mounted, as seen in plane view, from the side and from the top, respectively;

Figs. 35-36 show different enlarged details of Fig. 33;

Fig. 37 shows a schematic perspective view of a plate provided with an image at the front side by a method according to the invention; and

Fig. 38 shows a sectional view illustrating how a plate is provided with an image at the front side by a method according to the invention.

Identical or corresponding elements in different Figures of the drawing will be provided with the same designations. Each single detail will thus not be explained in connection with each Figure.

Fig. 1 shows a suspension arrangement 1 in the shape of a wall which is to be used for displaying articles. The plate 2 has a height corresponding to the height of a room in which it is mounted, and it may have different widths. The plate 2 is mounted on a wall 3, in that on the back side of each plate there is provided reinforcement sections 4 that are fastened along the height of plates and which have coupling means (described below) with coupling means on horizontal members 5 that are fastened on the wall. The plates have a front side 6 and a back side 7. This particularly appears from Fig. 4.

In the interspace 8 formed between the wall 3 and the back side 7 of the plates 2, panels 9 are provided for electric installations. Electric connections 10 provided at the wall 3 will thus be used for passing wires via the vertical panels 9 to a desired level, as the installations are hidden behind the plates 2. In Fig. 1 are illustrated examples of wiring 11 in the panels 9, as the latter, for the sake of clarity, are shown with the back side facing forward in relation to the way in which they are mounted on the wall 3. The shown wiring 11 will thus be disposed between the wall 3 and the panels 9.

The suspension arrangement furthermore includes lamps 12 for illuminating the articles to be displayed. On Fig. 1 is also seen a shelf 13 for use in displaying articles and box 14.

Fig. 2 shows the suspension arrangement of Fig. 1 with the parts assembled and mounted on the wall 3. On Fig. 2 is illustrated a power outlet 15 at the front side of the



plates 2. It appears that the plates 2 are forming an unbroken covering of the wall, and that the plates at each side are finished with end pieces 16 hiding the interspace located behind the plates 2. Alternatively, the plates 2 may cover a whole wall so that there is no need for end pieces 16.

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The plates 2 comprise vertical grooves 17 disposed with mutual spacing 18 which is substantially less than the mutual spacing 19 between two subsequent reinforcement sections 4 at the back side of the plates.

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Fig. 3 illustrates schematically that holes 20, which open at the back side of the plates, are provided along the vertical extension of the grooves 17. As explained later, it will be possible to mount suspension fitting through these holes, e.g. as illustrated by a shelf support holder 83 in Fig. 4.

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Fig. 5 illustrates how the panels 9 are mounted so that the connection points 10 are situated inside the panels. Electric wiring may hereby be provided via the panels, e.g. to the connection 15 which is disposed opposite a panel 9. Alternatively, wires may be drawn out at different levels on the plates in order to pass the wires via the holes 20 for providing for articles that are displayed in the suspension arrangement, e.g. by placing on the shelf 13. Likewise, it will be possible to perform a mutual connecting of different elements with signalling wires and the like. Wires from the box 14 may thus be passed through holes 20 and taken out via holes that are situated right behind other articles, for example on the shelf 13. All wiring will thus be mounted at the back side of the plates and may come out via the holes 20 that are also used when suspension fittings, e.g. for the shelf support holder 83, are fitted in the plates.

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By the plates it thus becomes possible to mount suspension fittings in a very flexible way, irrespectively whether electric or signal wiring for the displayed articles is required or not.

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Furthermore, it is noted that the suspension fittings can be disposed as shelf support holders supporting shelves with different widths, but at least a shelf width corresponding to the spacing between two succeeding grooves 17. Alternatively, hooks or pegs may also be disposed in each single groove for suspending articles that

only require suspension on a hook or a peg which does not need to have a dimension wider than the width of the individual groove 17.

5 Fig. 6 illustrates an embodiment of a suspension arrangement where the plates 2 are suspended on vertical support members 21 which are mounted on a wall (not shown).

10 Figs. 7-9 show views of the suspension arrangement of Fig. 6. It is thus said that the plates 2 are provided with mounting fittings 22 that interact with the vertical support members 21. The mounting fittings 22 are disposed at separate positions distributed across the back side of the plate 2.

On the detail views on Figs. 10 and 11 it appears more clearly that the mounting fittings 22 have a projecting sidewall 23 at the outer end of which there is a hook-shaped notch 24. The hook-shaped notch 24 is intended for disposition over pins 25 that project from the sides of the vertical support members 21. As it will appear, it is easy to lift individual plates 2 off the engagement, or to mount these on the members 21 by making the hook-shaped notches 24 engage over the pins 25. Hereby is formed the interspace 8 extending from the inner side 26 of the member 21 which is intended for bearing against the wall and the back side 7 of the plate 2.

20 On the enlarged detailed views furthermore appears that the grooves 17 have a depth 27 and a width 28. In a specific embodiment, the depth will be 5 mm, and the width will correspondingly be 5 mm. The spacing between juxtaposed grooves 17 is 95 mm. The grooves will thus only cover a limited part of the surface of the plate, and due to the depth of the grooves, the through-going opening will only be visible for a viewer to a very limited extent. The wall surface of the suspension arrangement will thus appear largely unbroken with a pattern of vertical grooves.

30 The wall may appear more as unbroken when an image is applied to it in a way explained below with reference to Figs. 37 and 38.

Fig. 12 illustrates examples of plates 2 that are provided with grooves 17 and through-going holes 20. The plates 2 have different widths. It is furthermore seen that one of the narrow plates are provided with a through-going opening 29. Outlets or

connections 15 may be provided via the through-going opening 29. The connection 15 may thus be permanently fitted on the panel 9 instead of constituting a separate connection which is mounted at the front side of the plates 2. The concrete design of the large plates will typically have a dimension of 2400 mm in height, 572 mm in width and a thickness of 18 mm. Narrow plates 2 for covering the panels 19 will typically have the same height but with a width of 172 mm and a thickness of 18 mm.

The plate 2 with the opening 29 will be intended for external power supply, whereas the other narrow plate 2 will be intended for covering an internal power supply which is carried in the panel 29 behind the plate 2. The plates can be made of various materials, but will preferably be made of wood. For all embodiments it is may be so that the plates are provided with openings as well as milled grooves, or alternatively be provided with a base plate in which the holes 20 are drilled and where a number of juxtaposed elongated front side plates are provided that mutually form the grooves 17.

Fig. 13 shows an end piece 16 corresponding to that of Fig. 1. It appears from the enlarged detail in Fig. 14 that the end piece 16 consists of a base plate 30 with a width that may cover the interspace 8 between the plate and the wall 3. The end piece 16 furthermore has a turn-in edge part 31 which is intended for covering the foremost edge area of the outermost plate 2 in the suspension arrangement.

Fig. 15 illustrates different suspension fittings for use on the wall of the suspension arrangement. Common to all suspension fittings is that they have a part 32 intended for passage through a hole 20, and a part 33 disposed behind the plate 2, and which has a bearing plate 34 that may bear against the back side 7 of the plate. Each of the suspension fittings also has a part 35 that project from the front side of the plate. A support face 36 is provided at the projecting part 35 for support against a bottom face 37 (see Fig. 11) of a groove 17 and which has thickness that corresponds to the spacing between opposite sidewalls 38 (see Fig. 10) in the groove.

The suspension fittings will thus have support parts 34 against the back side of the plate and support parts 36 that bear against the bottom of the groove 17. Furthermore, the thickness of the suspension fittings will ensure lateral stabilisation of the suspension fittings. On Fig. 15 is shown a so-called side hanger 39 which has a width

of 364 mm. Furthermore is shown a corresponding side hanger 40 with a width of 942 mm. Also illustrated are so-called spike-bars 41 and 42 with a length of 364 mm and 942 mm, respectively. 43 designates a shelf support holder that may be produced in different lengths. A shelf support holder will typically have a thickness of 5 mm and a height of 28 mm, and with a length being 280, 330, 380 or 430 mm. Also illustrated is a front hanger 44 which also will have a thickness of 5 mm and a height of 28 mm and a length of 300 mm. A shelf support holder and a front hanger are designed with largely identical shapes. However, it appears that the shelf support holder 43 is provided with two notches 45 for supporting a shelf, whereas the front hanger 44 is provided with a single notch 46 at the outer end.

47 illustrates an angular support holder with a first section 48 and a second section 49 displaced in relation to the first section, and which is connected to a vertical section 50.

51 illustrates a so-called nick arm which is a suspension fitting extending obliquely in relation to the plate, and which at its top side is provided with a number of notches, e.g. for the support of brackets. The length may be 364 mm.

53 designates a hook which is intended for interaction with the spike-bars 41, 42. The hook 43 has rear branches 54 intended for disposition at the back side of a plate 55 in the spike-bars 41, 42, and a front hook part 56 which is provided for disposition at the front of the plate 55.

57 designates a hook which is intended for placing in the wall plate. The hook may have a thickness of 5 mm and lengths of 150, 200 or 250 mm.

Fig. 16 illustrates different sizes and shapes of shelves for use in the suspension arrangement. The shelves 13 may thus be provided in embodiments 58, 59 with edge profiles or in embodiments 60, 61 as rectangular shelves without edge profiles. Shelves 58, 60 are shown that may have a length of 942 mm and a thickness of 18 mm and a width that may be 300, 350, 400 or 450 mm. Furthermore, shelves 59, 61 are shown that may have a length of 364 mm and a thickness of 18 mm and a width that may be 300, 350, 400 or 450 mm.

Figs. 18 and 20 show fittings 62, 63 for electric ducts with a length of 1200 mm and 2400 mm, respectively. These fittings 62, 63 are intended for mounting 65 with their side plate 64 disposed against a wall. The side plate 64 is provided with holes for accommodating screws with which they are fastened. Each fitting has a further wall 66 which is bent out from the wall for forming an internal space 67 for accommodating electric installations. The wall 66 furthermore has a turn-up side edge 68, the outermost edge area 69 of which is angularly bent inclining outwards in relation to the wall.

10 The angular edge area 69 is intended for interacting with slots 70 which are illustrated in Fig. 17 and in the enlarged detail in Fig. 21. The slots 70 are formed in an angular reinforcement section 71 which is made for disposition along the height of a plate and extending with largely vertical orientation. The plates are mounted directly on an electric fitting by interaction between the slots 70 and the angular edge areas 69.

15 Figs. 22 and 23 show alternative fittings 72, 73 for placing directly on a wall. These are made with lengths of 1200 mm and 2400 mm, respectively. These fittings 72, 73 have a sidewall 74 in which there are openings 75 for accommodating screws for fastening on the wall.

20 Fig. 24 shows an enlarged view of the section used for making fittings 72, 73. It appears that each fitting has a bent edge area 76 which also is angular with orientation away from the wall in order to interact with the slots 70 in the angular reinforcement sections 71.

25 The Figures 25-28 show different views of a plate 2. Fig. 25 shows a plate from behind, and Fig. 26 shows the same plate as seen from the front. It appears that the plate is provided at the back side with a uniform pattern of holes 20, and that this pattern ends with half holes along the opposite side edges 77 of the plate 2. From Fig. 26 appears that the front side 6 of the plate is provided with grooves with uniform spacing, and where the side edge 77 of each plate ends with a half groove. It is preferred in practice that a laminated wall is assembled with side edges at the bottom of the grooves 17, as plate joints hereby appears least visible for the viewer.

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Figs. 29-31 illustrate an enlarged detail of the plate shown in Fig. 26 which furthermore illustrates the half holes and the half groove.

5 Figs. 32-34 show different views of a suspension arrangement where the plates 2 are mounted on horizontal fittings 62 via the angular suspension sections 71. The partially enlarged view in Fig. 36 clearly shows the interaction between a fitting 62 and a reinforcement section 71.

10 In the mounted plates there is provided various examples of mounting means of the type illustrated in Fig. 15.

15 Fig. 35 shows an enlarged detail illustrating the interaction between a suspension fitting and the plate 2. It appears that the bearing surface 34 bears against the back wall of the plate, and that the bearing face 36 bears against the bottom surface 37 of a groove 17.

20 Fig. 37 shows a view of a plate 2, the front side of which being provided with an image schematically indicated by 78. The image is applied to the front side 6 of the plate 2.

25 In Fig. 38 is illustrated an inkjet printer 79 sending an ink jet 80 towards the plate 2. An image 78 consisting of image parts 81 is hereby formed, situated at the top side of the plate parts located between the grooves 17, as well as consisting of other image parts 81 located at the bottom faces of the grooves. 17. For the viewer, a plate 2 will be provided with an unbroken image. The inkjet printer 79 can be set to make an image covering an assembly of one or more plates. Thus it will be possible to convey juxtaposed plates through a large printer so that a continuous image is formed on a plurality of juxtaposed plates. Alternatively, separate images can be made on each individual plate.

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In the above, the invention is described with reference to a separate embodiment where the suspension arrangement is shown in an embodiment for forming a display wall. Alternatively, it is possible to erect the plates to that they appear as a freely standing wall with two plates disposed at each their side of a frame, so that

installations and support are located within the frame, and where the front side of the plates with grooves is mounted at opposite sides of such a free-standing wall.